REMARKS

By this amendment, Applicants have amended claim 2 to include therein the substance of dependent claims 4 and 9. Accordingly, claims 4 and 9 have been canceled without prejudice or disclaimer. Claims 5-8 have been amended to depend from claim 2, and claims 13 and 14 amended to correct an antecedent basis issue.

The foregoing amendments place the application in condition for allowance of the reasons set forth hereinafter or, at least, in better form for consideration on appeal. Moreover, since the Examiner has already considered the limitations previously recited in claims 4 and 9, it is submitted the foregoing amendments do not raise new issues requiring further consideration and/or search. Therefore entry of this amendment under 37 CFR 1.116 is requested.

Claims 2, 4-11 and 13-16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,545,307 to Morita et al. in view of U.S. Patent No. 5,727,480 to Garcia-Mallol and U.S. Patent No. 4,135,874 to Tsuzi et al. Applicants again traverse this rejection and request reconsideration thereof.

The present invention relates to a combustion apparatus including a burner burning a fuel within a furnace in a theoretical air ratio or less, an air port arranged downstream of the burner and separated into a flow path injecting additional combustion air into the furnace and a flow path injecting a nitrogen oxide generation inhibiting gas in a mixing region formed by both of a combustion gas generated by burning the fuel by means of the burner and the additional combustion air injected from the air port or near the mixing region. The nitrogen oxide generation inhibiting gas is constituted by at least one gas selected from a group consisting of the combustion exhaust gas and a mixed

gas of the combustion exhaust gas and air. The inhibiting gas injection port is provided on an outer peripheral portion of the air injection port, at least a portion of the outer peripheral portion being on a burner side of the air injection port. At least one blower is provided for circulating combustion exhaust gas from an outlet of the furnace to an inlet of the flow path injecting a nitrogen oxide generation inhibiting gas, and for supplying the additional combustion air to the flow path injecting additional combustion air into the furnace.

The Morita et al. patent discloses a coal combustion apparatus, which apparatus comprises a pulverized coal-feeding pipe inserted into a burner throat on the lateral wall of a combustion furnace and for feeding the coal and air into the furnace; a means for feeding the coal and air into the coal pipe; a secondary air passageway formed between the coal pipe and a secondary air-feeding pipe provided on the outer peripheral side of the coal pipe; a ternary air passageway formed on the outer peripheral side of the secondary air-feeding pipe; a means for feeding air or an oxygen-containing gas into the secondary air passageway and that into the ternary air passageway; and a bluff body having a cross-section of a L-letter form provided at the tip end of the coal pipe.

Morita et al. discloses an air port 57 in Fig. 1 and the description thereof, and describes that the reducing flame is formed by making an air-deficient zone in the burner zone of the furnace, and the combustion is improved in a whole of the furnace by supplying the shortfall air thereinto from the air port 57 provided in the slip stream of the burner so as to effect complete combustion, thereby reducing the NOx discharge amount (col. 1, lines 45-56).

In Morita et al., reference numeral 12 denotes a secondary air register; it is not described anywhere as an inhibiting gas feeding means. In other words, the reduction of the NOx discharge amount depends exclusively on the burner in the forward flow side, and the unburned combustible is reduced by providing the air port in the slip stream side so as to feed the combustion air for complete combustion, with respect to the combustion gas which is low NOx gas from the burner zone that has a large amount of unburned combustible.

The Morita et al. patent describes that the air, the combustion exhaust gas and the mixed gas thereof can be used as the primary, secondary and tertiary air, with regard to the burner, and does not describe the operation and the effect at a time of feeding the combustion exhaust gas and the mixed gas in place of the combustion air at all.

In short, the Morita et al. patent shows the burner structure, but does not show the air port structure.

The Garcia-Mallol patent discloses an over-fire air control system for a pulverized solid fuel furnace. The Office Action refers to the flow paths 28 and 30 of Garcia-Mallol as being the flow paths for "combustion air" and "nitrogen oxygen generation inhibiting gas," respectively. It is submitted this is not the case. Claim 2 of the subject application requires that the nitrogen oxide generation inhibiting gas be constituted by at least one gas selected from the group consisting of combustion exhaust gas and a mixed gas of the combustion exhaust gas and air. This nitrogen oxide generation inhibiting gas is injected through an inhibiting gas injection port provided on an outer peripheral portion of the air injection port, which injects an addition combustion air into the furnace. Thus,

the nitrogen oxygen generation inhibiting gas port injects a gas different from that injected through the air injection port.

On the other hand, Garcia-Mallol describes that the damper 22a controls the amount of air circulating in the flow path 28, and the damper 22b controls the amount of air circulating in the flow path 30, as shown in Fig. 1 and described in the relevant description. However, since the two dampers are within the same duct 24 and only the secondary air enters into the duct 24, only the secondary air is distributed through both flow paths 28 and 30. In other words, fluid having the same composition flows to the flow paths from two dampers, and the fluid is the secondary air. The fact that the secondary air is the combustion air is particularly based on the description in line 66, column 3, to line 22, column 4 of Garcia-Mallol.

The Tsuzi et al patent discloses a furnace whose NOx emission may be reduced by optimally controlling the ratio of exhaust gas mixed with the combustion air to be supplied to the burners to the exhaust gas to be mixed with the two-stage combustion air which is admitted through air nozzles into the combustion chamber and also by optimally controlling the distribution of the two-stage combustion air in the combustion chamber depending upon the operating conditions.

However, in Tsuzi et al, it appears a single mixture gas is introduced through each two-stage combustion air injection nozzle. This type of arrangement may suffer from the deficiency described at page 5, lines 17-23 of applicants' specification, i.e., that it may be necessary to supply a lot of exhaust gas or low-temperature air for lowering the temperature of the high-temperature combustion gas in the upper portion of the

burner within the furnace. Accordingly, a power generation efficiency of the plant may be significantly reduced.

On the other hand, air port arranged downstream of the burner of the present invention is separated into a flow path injecting additional combustion air into the furnace and a flow path injecting a nitrogen oxide generation inhibiting gas in the mixing region. This is not disclosed by Tsuzi et al. Accordingly, the Tsuzi et al patent does not remedy the deficiencies noted above with respect to the proposed combination of Morita et al. and Garcia-Mallol.

Therefore, the presently claimed invention is patentable over the proposed combination of Morita et al., Garcia-Mallol and Tsuzi et al.

Claim 12 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. in view of Garcia-Mallol and Tsuzi et al. and U.S. Patent No. 5,231,937 to Kobayashi et al. Applicants traverse this rejection and request reconsideration thereof.

The Kobayashi et al. patent has been cited by the Examiner as allegedly teaching that is known to lower the temperature of an exhaust gas by means of a heat exchanger. However, since claim 12 ultimately depends from claim 2, it is submitted claim 12 is patentable at least for the reasons noted above with respect to claim 2.

In view of the foregoing amendments and remarks, entry of this amendment and favorable reconsideration and allowance of all of the claims now in the application are requested.

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paper, including excess claim fees, to Deposit Account No. 01-2135 (500.45104X00), and please credit any excess fees to such deposit account.

Respectfully submitted,
ANTONELLI, TERRY, STOUT & KRAUS, LLP

/Alan E. Schiavelli/
Alan E. Schiavelli
Registration No. 32,087